The Examiner has rejected claim 1 under 35 U.S.C. § 102(b) for purported anticipation by, or under 35 U.S.C. § 103(a) for purported obviousness over, U.S. Patent No. 5,935,700 to Enomoto et al. ("Enomoto") in view of U.S. Patent No. 5,316,714 to Yoneda et al. ("Yoneda"). The Examiner asserts that Enomoto discloses composite particles of silica and at least one other inorganic oxide other than silica, and that suitable particles range in size from 10 nm to 2 microns. The Examiner also asserts that Enomoto teaches that the composite oxides may be employed as an organosol in alcohols, glycols and ketones reading on the dielectric constant claimed for organic compounds in the present application. The Examiner further asserts that Enomoto teaches that the particles may be surface modified by silane coupling agents, and that a silica to other oxide ratio within a range of 3 to 500 may be used. The Examiner asserts that Yoneda teaches glycol dispersions for imparting slipperiness to polyester films. The Examiner also asserts that Yoneda teaches coupling agents with molecular polarizabilities as claimed in the present invention for treating the particulate sols.

The Examiner maintains that the references are combinable because they teach providing slipperiness to polymer films, and that it would have been obvious for one skilled in the art to use specific coupling agents taught by Yoneda as coupling agents broadly taught by Enomoto. The Examiner concludes that one of skill in the art, on reading Enomoto in view of Yoneda, would have expected that glycol sols surface modified with the silanes of Yoneda would have produced stable sols.

Particles of an inorganic oxide must generally have their surfaces rendered hydrophobic for obtaining an organic solvent dispersion thereof. Thus, generally, the surfaces of such particles are modified.

However, even if a coupling agent is used for modifying the surface of the inorganic compound particles, the resulting particles do not always have high dispersibility in the specific dispersion medium.

The present invention relates to an inorganic compound sol having compound particles dispersed in a dispersion medium, which can be used in a coating material, an insulating coating and a protective coating of electrical and electronic parts. As described above, surface modification by a coupling agent is well known in the art. However, it remained difficult to obtain an organic sol having a high dispersibility. Moreover, the problem has been encountered that, when the inorganic compounds described above are used as a filler in, for example, a coating material, a hard coating agent component of an insulating coat and a protective coat, adding a sol thereof to a matrix of coating film-forming agent is likely to invite an aggregation of particles in the matrix. Especially, when the organic solvent sol is used in the presence of a cation (alkali), anion (acid) or surfactant, particles in the sol may be aggregated and a gelation may occur. For example, when these inorganic compounds are used as a coating material, the problem of the coating material becoming viscous and whitening has been encountered because the organic solvent sol is poorly compatible with the coating film-forming resin and the resin emulsion being obtained in the presence of a cation. In another specific application, in order to improve soil strength, a sol in which inorganic compound particles are dispersed is added to a cement to obtain a soil stabilizer. In the event that the sol has poor stability, difficulty may be encountered in filling up crevices between the soils and moles with the inorganic compound particles in the presence of a cation.

The present invention has been made in view of these circumstances, and the object of the present invention is to provide an organic compound sol modified by an inorganic compound which has an excellent dispersion stability. According to the present invention, even

if an organic or inorganic acid or salt thereof is present in the inorganic compound sol, the SiO_2 composite particles would not aggregate with each other and gelation would not occur. In the case in which the dispersion does not contain an ionic component such as an organic acid, any combination of the coupling agent and the solvent may be used. In contrast, if the dispersion does not contain an ionic component such as an organic acid, only a limited combination of a specific silicone-coupling agent having a specific polarizability and dispersion media having a specific dielectric constant can be used. Otherwise, an inorganic compound sol having high dispersibility cannot be obtained. Given the prevalence of compounds producing, to at least some extent, charged species in dispersion, teachings of dispersion stability only in the absence of charged species do not address the general problem of dispersion stability.

The cited prior art references do not teach, alone or in combination, the present invention because neither reference teaches or suggests either a formulation that is stable in the presence of ions or the theoretical basis whereby such a stable formulation can be obtained. The advantage of the present invention, thus, does not flow naturally from following the suggestion of the prior art.

The use of the silicone-coupling agent leads to an affinity of the inorganic compound with the organic solvent to enhance stability; the dispersibility of inorganic compound particles is thus improved. When particle size decreases, the particles become likely to aggregate with each other because the attraction between particles becomes stronger. When surfaces of particles are charged with the same charge, the particles repel each other to disperse stably. In addition, when the particle surface is charged, the charge is neutralized by the presence of ions. Ions thereby eliminate the repulsion of particles by charge, and gelation and aggregation result.

In the present invention, particles are modified by an organic compound having the specific molecular polarizability that inhibits charge neutralization and makes the particles

disperse stably. The prior art does not teach the present invention if the prior art does no more than teach an extensive list of compounds that includes the specific compounds of the present invention, and contains no recognition of the specific problem addressed by the present invention. Accidental results, not intended and not appreciated, do not constitute anticipation.

Enomoto does not address sol stability. Yoneda contains no suggestion at all pertaining to obtaining an organic sol which has excellent stability in sol or solution in the presence of acids, alkalis or surfactant. Neither Enomoto nor Yoneda, therefore, alone or in combination, contains any teachings with respect to sol stability in the wide range of situations in which charged species are present. Accordingly, claim 1 represents a patentable advance over Enomoto in view of Yoneda.

In view of the above, it is submitted that the claim is in condition for allowance. Reconsideration of the rejections is requested. Allowance of claim 1 at an early date is solicited.

Respectfully submitted,

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